



June 16, 2014

Mr. Dwight Leisle
Port of Portland
7200 NE Airport Way
Portland, Oregon 97218

Re: Surface Soil Sampling Results – DU-6
Willamette Cove Upland Facility
Portland, Oregon
ECSI No. 2066
1056-03

Dear Mr. Leisle:

This letter presents the results of surface soil sampling activities to better define the extent of mercury and dioxins/furans in Decision Unit 6 (DU-6) for the Willamette Cove Upland Facility (the Facility; Figures 1 and 2) in the St. Johns area of Portland, Oregon. Work at the Facility is being conducted under Voluntary Agreement EC-NWR-00-26 between the Port of Portland (Port), Metro, and the Oregon Department of Environmental Quality (DEQ). The sampling activities were completed in accordance with the DEQ-approved scope presented in the *Proposed Surface Soil Sampling – DU-6* letter (Apex, 2014) and the response to DEQ comments (Port, 2014). The methods, procedures, and results of the chemical analyses are presented in this letter.

SAMPLING ACTIVITIES

Preparatory Activities

The following activities and schedule coordination were completed in preparation for the field work.

- **Health and Safety Plan (HASP).** Apex Companies, LLC (Apex) updated the HASP for its personnel involved with the project.
- **Coordination of Facility Access.** The work activities were conducted in coordination with Metro.

Surface Soil Sampling

Surface soil samples were collected from DU-6 at the same locations as the incremental sample locations that constituted sample DU-6. Figure 3 shows the sample locations. Soil samples were collected using the following protocols.

- The sample locations were established using a high-accuracy, handheld global positioning system (GPS) device (Trimble® GeoXH™).
- The samples were collected from the top 6 inches of surface soil (after removing vegetation) with a 0.5-inch-diameter cylindrical stainless steel sampler. Multiple aliquots were collected at each location (within a 5-foot diameter) in order to collect sufficient volume for analysis.

- The soil collected at each sample location was thoroughly homogenized in a stainless steel bowl. Following homogenization, one 2-ounce jar and one 4-ounce jar were collected. These samples were labeled DU-6-## where ## corresponds to the sample location number from Figure 3.
- Non-disposable items (e.g., sampler, spoons, bowls, etc.) were cleaned by washing in a detergent (Alconox®) solution, rinsing with tap water, followed with a deionized water rinse prior to initiating sampling and between sampling locations.

CHEMICAL ANALYSES

Replicate soil samples from the eight composite areas (DU-6-COMP-1 through DU-6-COMP-8) were submitted to the following laboratories for the following analyses:

- Vista Analytical (Vista) of El Dorado Hills, California for dioxins/furans by EPA Method 8290; and
- Apex Labs of Tigard, Oregon for mercury by EPA 7471.

The requested method reporting limits (MRLs) were consistent with the historical laboratory analyses and the concentrations were presented to the method detection limit (MDL).

Dioxins/Furans. Vista was instructed to create each composite using the following protocol.

- Remove an equal mass from each jar to attain the 30 gram composite mass required for digestion/analysis. The mass from each jar was dependent on the number of discretes that were composited for the analysis.

Vista indicated that the sample results for selected samples could not be diluted enough to report within the calibration curve for the instrument. Those composites were resampled using a 1 to 2 gram mass.

The laboratories initially analyzed samples DU-6-COMP-1 through DU-6-COMP-8. Based on those results, Vista was directed to analyze the discrete samples from DU-6-COMP-5 and DU-6-COMP-6. In addition, a composite sample comprised of discrete samples DU-6-COMP-7-3, DU-6-COMP-7-4, DU-6-COMP-7-5, and DU-6-COMP-7-6 was also analyzed.

Mercury. Apex Labs was instructed to analyze each individual sample for mercury (i.e., no compositing).

The laboratory analytical results are presented in Tables 1 and 2. The laboratory analytical reports (in CD-Rom format due to the length of the Level III deliverable reports) are provided in Attachment A along with a data quality review.

CONCLUSIONS

The sampling presented in this letter will be used to refine the proposed remedial options.

If you have any questions regarding these activities, please contact the undersigned at (503) 924-4704.

Sincerely,



expires 12/31/2014

Michael J. Pickering, R.G.
Senior Associate Hydrogeologist

REFERENCES

Apex, 2014. Proposed Surface Soil Sampling – DU-6, Willamette Cove Upland Facility, Portland, Oregon. March 19, 2014.

Port, 2014. Response to DEQ Comments, Proposed Surface Soil Sampling – DU-6, Willamette Cove Upland Facility. March 25, 2014.

ATTACHMENTS

Table 1 - Soil Sample Results - Dioxins/Furans
Table 2 - Soil Sample Results - Mercury

Figure 1 – Facility Location Map
Figure 2 – Facility Plan
Figure 3 – Sampling Plan

Attachment A – Laboratory Analytical Reports and Data Quality Review (CD-ROM)

Table 1 - Soil Sample Results - Dioxins/Furans
Willamette Cove Upland Facility
Portland, Oregon

Sample ID: Sample Type: Date:	DU-6-COMP-1 Composite 4/8/2014	DU-6-COMP-2 Composite 4/8/2014	DU-6-COMP-3 Composite 4/8/2014	DU-6-COMP-4 Composite 4/8/2014	DU-6-COMP-5 Composite 4/8/2014	DU-6-COMP-5-1 Discrete 4/8/2014	DU-6-COMP-5-2 Discrete 4/8/2014	DU-6-COMP-5-3 Discrete 4/8/2014	DU-6-COMP-5-4 Discrete 4/8/2014	DU-6-COMP-5-5 Discrete 4/8/2014	DU-6-COMP-5-6 Discrete 4/8/2014
Dioxins/Furans (EPA 1613B; ng/kg)											
2,3,7,8-TCDF	0.859	0.737	3.00	2.33	22.5 J	2.46 J	<0.083	4.59 J	30.3	4.27 J	237
2,3,7,8-TCDD	0.716	0.947	5.01	0.693	772	40.0	59.7	76.9	1,180	41.9	10,400
1,2,3,4,6,7,8-HpCDD	309	282	1,250 E	358	180,000	7,310	13,500	24,100	234,000	5,860	2,540,000
1,2,3,4,6,7,8-HpCDF	80.3	70.2	402	69.0	56,200	2,280	3,740	7,950	81,900	1,800	454,000
1,2,3,4,7,8,9-HpCDF	3.07	2.12	6.52	3.85	672	28.4	44.7	89.6	1,100	27.7	6,840
1,2,3,4,7,8-HxCDD	4.10	5.33	34.8	6.16	4,830	253	435	666	8,720	195	89,600
1,2,3,4,7,8-HxCDF	3.04	3.33	8.96	4.10	898	37.3	55.8	107	1,200	40.4	9,150
1,2,3,6,7,8-HxCDD	65.6	102	724	114	145,000	4,710	8,430	14,600	198,000	3,560	1,690,000
1,2,3,6,7,8-HxCDF	2.10	2.30	9.93	3.76	1,220	49.4	82.5	136	1,540	46.9	12,100
1,2,3,7,8,9-HxCDD	37.5	60.4	451	64.3	81,300	3,070	5,530	9,250	118,000	2,500	949,000
1,2,3,7,8,9-HxCDF	0.733 J	0.418 J	1.79	0.688 J	162	4.84 J	7.99 J	15.6 J	218	9.72 J	1,260 J
2,3,4,6,7,8-HxCDF	3.03	2.85	12.8	6.59	1,350	64.8	99.7	159	1,880	59.1	13,100
1,2,3,7,8-PeCDD	8.85	16.1	108	13.5	19,300	768	1,270	1,910	26,400	663	218,000
1,2,3,7,8-PeCDF	1.05 J	1.21	2.95	1.40	124 J	7.76 J	11.1 J	18.7 J	185	9.38 J	1,610 J
2,3,4,7,8-PeCDF	0.947 J	1.35	5.98	4.03	241	9.91 J	16.3 J	50.4	293	15.9 J	3,280
OCDF	217	93.1	264	250	18,900	717	1,220	2,690	27,300	661	139,000
OCDD	1,760	1,170	2,130	1,870	45,600	3,570	4,800	8,510	63,200	5,340	629,000
Total TCDF	15.8	11.8	54.5	55.1	887	53.0	75.1	141	1,460	122	6,680
Total TCDD	10.1	13.0	69.6	19.7	9,560	476	655	992	14,300	521	128,000
Total PeCDF	29.4	23.3	107	101	3,940	280	374	524	6,560	370	41,000
Total PeCDD	57.8	96.6	631	82.7	118,000	4,700	7,480	12,100	164,000	4,250	1,350,000
Total HxCDF	73.2	60.6	231	111	26,500	1,180	1,790	3,240	34,300	1,100	226,000
Total HxCDD	425	675	4,640	622	843,000	32,100	52,500	96,200	1,270,000	25,000	11,700,000
Total HpCDF	251	168	712	260	91,600	3,660	5,800	12,700	130,000	2,970	728,000
Total HpCDD	599	550	2,580	681	362,000	15,800	26,700	50,000	494,000	12,300	6,300,000
TEQMinWHO2005Dioxin	26.1	39.1	257	40.6	46,000	1,730	2,970	4,820	63,800	1,430	536,000

See notes on last page.

Table 1 - Soil Sample Results - Dioxins/Furans
Willamette Cove Upland Facility
Portland, Oregon

Sample ID: Sample Type: Date:	DU-6-COMP-6 Composite 4/8/2014	DU-6-COMP-6-1 Discrete 4/8/2014	DU-6-COMP-6-2 Discrete 4/8/2014	DU-6-COMP-6-3 Discrete 4/8/2014	DU-6-COMP-6-4 Discrete 4/8/2014	DU-6-COMP-6-5 Discrete 4/8/2014	DU-6-COMP-6-6 Discrete 4/8/2014	DU-6-COMP-7 Composite 4/9/2014	DU-6-COMP-8 Composite 4/9/2014	DU-6-COMP-7-3/7-4/7-5/7-6 Composite 4/9/2014
Dioxins/Furans (EPA 1613B; ng/kg)										
2,3,7,8-TCDF	8.28 J	10.8	2.7 J	4.34 J	8.46	5.14	9.20	4.89	4.49	3.65
2,3,7,8-TCDD	80.8	9.96	<0.0510	59.9	157	87.4	187	54.9	11.1	41.2
1,2,3,4,6,7,8-HpCDD	24,200	1,840	1,070	12,400	50,200	36,600	60,300	11,000	3,010	8,910
1,2,3,4,6,7,8-HpCDF	7,710	569	331	4,430	18,100	7,430	16,100	3,580	751	2,710
1,2,3,4,7,8,9-HpCDF	84.1 J	12.5 J	7.69 J	50.9	177	109	172	51.5	25.7	41.8
1,2,3,4,7,8-HxCDD	559	62.2	37.4	403	1,330	1,010	1,760	339	74.1	276
1,2,3,4,7,8-HxCDF	131 J	36.7	10.9 J	65.4	222	123	224	62.5	23.3	49.8
1,2,3,6,7,8-HxCDD	18,400	1,010	529	8,770	32,500	33,400	41,800	7,160	1,260	4,830
1,2,3,6,7,8-HxCDF	145 J	30.5	12.2 J	86.1	239	177	260	82.2	26.3	60.8
1,2,3,7,8,9-HxCDD	10,600	635	345	5,380	20,600	16,000	27,300	3,800	736	3,140
1,2,3,7,8,9-HxCDF	21.3 J	2.7 J	2.53 J	15.5 J	18.7 J	15 J	31.5	14.7	3.76	4.16 J
2,3,4,6,7,8-HxCDF	162 J	28.7	17.3 J	107	292	206	325	97	38.1	77.6
1,2,3,7,8-PeCDD	2,030	152	83	1,270	3,570	2,840	5,280	1,100	196	807
1,2,3,7,8-PeCDF	19.5 J	19.4 J	3.25 J	15.3 J	35.7	19.2 J	40.0	11.8	5.96	9.72
2,3,4,7,8-PeCDF	26.2 J	21.4 J	13 J	26.5	56.7	30.0	49.7	19.5	9.20	17.0
OCDF	2,800	292	179	1,550	7,440	2,680	5,940	1,480	811	1,260
OCDD	9,390	3,190	1,940	4,700	17,100	13,300	18,600	16,300	17,100	14,100
Total TCDF	165	156	108	160	271	205	369	157	151	125
Total TCDD	1,190	289	54	782	1,990	1,080	2,730	632	143	462
Total PeCDF	685	315	267	546	1,080	791	1,420	486	311	414
Total PeCDD	13,400	1,260	504	8,180	22,900	15,700	32,600	6,130	1,230	4,770
Total HxCDF	3,340	454	275	2,000	7,070	3,690	7,480	1,850	683	1,550
Total HxCDD	115,000	6,740	3,550	58,500	213,000	162,000	280,000	39,000	7,950	32,700
Total HpCDF	12,600	962	574	7,130	29,700	12,000	26,200	5,440	1,850	4,520
Total HpCDD	52,500	3,640	2,100	26,800	107,000	76,900	130,000	20,000	5,470	18,600
TEQMinWHO2005Dioxin	5,450	376	198	2,990	9,960	8,480	13,400	2,470	470	1,820

- Notes:**
1. ng/kg = nanograms per kilogram
 2. -- = Not available, not calculated, or not analyzed.
 3. < = Not detected above the method detection limit (MDL)
 4. J = Estimated concentration.
 5. E = Above the High calibration Limit.

Table 2 - Soil Sample Results - Mercury
Willamette Cove Upland Facility
Portland, Oregon

Sample ID	Date	Mercury (mg/kg)
DU-6-COMP-1-1	4/8/2014	0.31 J2
DU-6-COMP-1-2	4/8/2014	0.841 J2
DU-6-COMP-1-3	4/8/2014	0.609 J2
DU-6-COMP-1-4	4/8/2014	0.112 J2
DU-6-COMP-1-5	4/8/2014	1.12 J2
DU-6-COMP-1-6	4/8/2014	8.29 J2
DU-6-COMP-1-7	4/8/2014	1.92 J2
DU-6-COMP-2-1	4/8/2014	0.956 J2
DU-6-COMP-2-2	4/8/2014	0.406 J2
DU-6-COMP-2-3	4/8/2014	0.534 J2
DU-6-COMP-2-4	4/8/2014	0.587 J2
DU-6-COMP-2-5	4/8/2014	0.516 J2
DU-6-COMP-2-6	4/8/2014	0.0796 J
DU-6-COMP-3-1	4/8/2014	0.124 J2
DU-6-COMP-3-2	4/8/2014	0.492 J2
DU-6-COMP-3-3	4/8/2014	0.183 J2
DU-6-COMP-3-4	4/8/2014	0.358 J2
DU-6-COMP-3-5	4/8/2014	0.142 J2
DU-6-COMP-3-6	4/8/2014	0.374 J2
DU-6-COMP-4-1	4/8/2014	3.88 J2
DU-6-COMP-4-2	4/8/2014	0.222 J2
DU-6-COMP-4-3	4/8/2014	1.82 J2
DU-6-COMP-4-4	4/8/2014	4.22 J2
DU-6-COMP-4-5	4/8/2014	0.113 J2
DU-6-COMP-4-6	4/8/2014	0.0993 J2
DU-6-COMP-4-7	4/8/2014	0.132 J2

Sample ID	Date	Mercury (mg/kg)
DU-6-COMP-5-1	4/8/2014	0.167 J2
DU-6-COMP-5-2	4/8/2014	0.244 J2
DU-6-COMP-5-3	4/8/2014	1.89 J2
DU-6-COMP-5-4	4/8/2014	0.799 J2
DU-6-COMP-5-5	4/8/2014	1.37 J2
DU-6-COMP-5-6	4/8/2014	2.07 J2
DU-6-COMP-6-1	4/8/2014	0.641 J2
DU-6-COMP-6-2	4/8/2014	0.316 J2
DU-6-COMP-6-3	4/8/2014	0.339 J2
DU-6-COMP-6-4	4/8/2014	1.03 J2
DU-6-COMP-6-5	4/8/2014	2.44 J2
DU-6-COMP-6-6	4/8/2014	11.3 J2
DU-6-COMP-7-1	4/9/2014	4.69 J2
DU-6-COMP-7-2	4/9/2014	3.35 J2
DU-6-COMP-7-3	4/9/2014	14.9 J2
DU-6-COMP-7-4	4/9/2014	0.582 J2
DU-6-COMP-7-5	4/9/2014	0.568 J2
DU-6-COMP-7-6	4/9/2014	1.41 J2
DU-6-COMP-8-1	4/9/2014	4.62 J2
DU-6-COMP-8-2	4/9/2014	1.99 J2
DU-6-COMP-8-3	4/9/2014	5.34 J2
DU-6-COMP-8-4	4/9/2014	1.42 J2
DU-6-COMP-8-5	4/9/2014	25.3 J2
DU-6-COMP-8-6	4/9/2014	1.98 J2

Notes:

1. Mercury by EPA 6020.
2. mg/kg = milligrams per kilogram
3. J = Estimate concentration.
4. J2 = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

The precision goal of 40% was exceeded for this analyte by the results of the lab duplicate.



Note: Base map prepared from USGS 7.5-minute quadrangles of Linnton and Portland, OR, dated 2011 as provided by USGS.gov.

0 2,000 4,000
Approximate Scale in Feet



Facility Location Map

DU-6 Surface Soil Sampling
Willamette Cove Upland Facility
Portland, Oregon



Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	1056-03
June 2014	

Figure
1



Legend:

- DU-6** Incremental Sample Decision Units
-  Historical Wharf Road Incremental Samples
-  Site Boundary

Source: Base map prepared from a 2005 aerial photograph.

0 250 500
Scale in Feet

Facility Plan

DU-6 Surface Soil Sampling
Willamette Cove Upland Facility
Portland, Oregon



Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

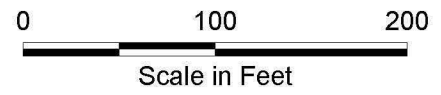
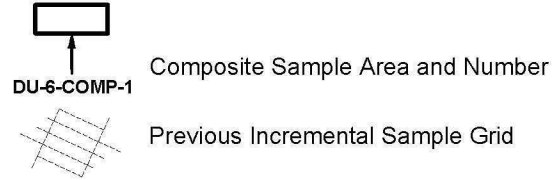
Project Number	1056-03
June 2014	

Figure
2



Legend:

- 1 ● Sample Location and Number
(Note: Sample locations correspond to DU-6 incremental sample aliquot locations)
- Site Boundary



Source: Base map prepared from a 2005 aerial photograph.

Sampling Plan

DU-6 Surface Soil Sampling
Willamette Cove Upland Facility
Portland, Oregon

 Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	1056-03	Figure 3
	June 2014		

Attachment A

Laboratory Analytical Reports and Data Quality Review (CD-ROM)